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EXAMINER

MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 11/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/728,723	Applicant(s) YENGOYAN ET AL.	
	Examiner Brian L. Mutschler	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-90 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-90 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                      | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.         |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                             | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>See 6</u> . | 6) <input checked="" type="checkbox"/> Other: <u>IDS: 05/07/2001; 02/22/2001</u> . |

**DETAILED ACTION**

***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **10**, identifying the CE system (see page 13, line 15). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Specification***

2. The disclosure is objected to because of the following informalities:
- a. On page 5 at line 22, please change "ore" to --or--.
  - b. Beginning with the first occurrence on page 7 at line 10, please use proper and consistent language when referring to chemical compounds using IUPAC names. For example, "3,4-dihydroxy 3-cyclobutene-1,2-dione" should be changed to --3,4-dihydroxy-3-cyclobutene-1,2-dione-- and "6 hydroxy 1 tetralone" should be changed to --6-hydroxy-1-tetralone--. Please correct all of the compound names using the two examples as a reference.
  - c. On page 9 at line 22 and all other occurrences, please change "naphthoquinone" to --naphthoquinone--.

Appropriate correction is required.

### ***Claim Objections***

3. Claims 14, 17, 18 and 57 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 14, which depends from claim 13, recites the limitation "wherein said group of vinylogous compounds include substituted forms wherein the vinylogous carboxylic acid UV-chromophore is maintained." Claim 13 recites a Markush group consisting of specific compounds. The limitation of claim 14 expands the list to include "substituted forms". Therefore, claim 14 is broader in scope than claim 13 and does not further limit the subject matter of claim 13.

Claim 17, which depends from claim 10, recites the limitation "said vinylogous carboxylic acid compounds include positively charged cationic ester derivatives of said compound" in lines 1-2. Claim 10 recites the limitation "wherein said one or more vinylogous carboxylic acid compounds is 2-hydroxy-2,4,6-cycloheptatrienone." Claim 17 is broader in scope than claim 10 because ester derivatives of a specific compound encompass many more compounds than the single, specific compound.

Claim 18, which depends from claim 10, recites the limitation "said vinylogous carboxylic acid compounds include positively charged cationic amide derivatives of said compound" in lines 1-2. Claim 10 recites the limitation "wherein said one or more vinylogous carboxylic acid compounds is 2-hydroxy-2,4,6-cycloheptatrienone." Claim

18 is broader in scope than claim 10 because amide derivatives of a specific compound encompass many more compounds than the single, specific compound.

Claim 57, which depends from claim 39, recites the limitation "said one or more probes are comprised of positively charged cationic ester derivatives of said vinylogous carboxylic acid compounds or positively charged cationic amide derivatives of said vinylogous carboxylic acid compounds." Claim 39 provides the limitation "one or more probes comprised of one or more vinylogous carboxylic acid compounds." If claim 39 requires the probes to comprise the compounds and claim 57 requires the probes to comprise derivatives of the compounds, claim 57 no longer meets the limitations of claim 39 because it doesn't contain the compounds, only derivatives of the compounds.

4. Claims 2, 7-13, 21, 26-32, 39, 40, 45-51, 59, 61, 66-72, 75, 77 and 82-88 are objected to because of the following informalities:
  - a. In claim 2 at line 3, please change "carbon nitrogen" to --carbon--nitrogen--. Please make similar changes in claims 21, 40, 61 and 77.
  - b. In claim 7 at line 2, please change "3,4-dihydroxy 3-cyclobutene 1,2-dione" to --3,4-dihydroxy-3-cyclobutene-1,2-dione--. Please make similar changes in claims 26, 45, 66 and 82.
  - c. In claim 8 at line 2, please change "2,5-dihydroxy 1,4 benzoquinone" to --2,5-dihydroxy-1,4-benzoquinone--. Please make similar changes in claims 13, 27, 32, 46, 51, 67, 72, 83 and 88.

- d. In claim 9 at line 2, please change "4,5-dihydroxy 4-cyclopentene 1,2,3-trione" to --4,5-dihydroxy-4-cyclopentene-1,2,3-trione--. Please make similar changes in claims 13, 28, 32, 47, 51, 68, 72, 84 and 88.
- e. In claim 10 at line 2, please change "2-hydroxy 2,4,6-cycloheptatrienone" to --2-hydroxy-2,4,6-cycloheptatrienone--. Please make similar changes in claims 13, 29, 32, 48, 51, 69, 72, 85 and 88.
- f. In claim 11 at line 2, please change "5,5 dimethyl 1,3 cyclohexane dione" to --5,5-dimethyl-1,3-cyclohexanedione--. Please make similar changes in claims 13, 30, 32, 48, 51, 69, 72, 85 and 88.
- g. In claim 12 at line 2, please change "6 hydroxy 1 tetralone" to --6-hydroxy-1-tetralone--. Please make similar changes in claims 13, 31, 32, 50, 51, 71, 72, 87 and 88.
- h. In claim 13 at line 3, please change "benzoquinone, and" to --benzoquinone;--. Please make similar changes in claims 32, 51, 72 and 88.
- i. In claim 13 at lines 4-5, please change "5,6 dihydroxy 5 cyclohexane 1,2,3,4 tetraone" to --5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone--. Please make similar changes in claims 32, 51, 72 and 88.
- j. In claim 13 at line 5, please change "2-hydroxy 1,4-naphthoquinone" to --2-hydroxy-1,4-naphthoquinone-- (please note the change in the spelling of naphthoquinone). Please make similar changes in claims 32, 51, 72 and 88.

- k. In claim 13 at line 5, please change "3-oxo 1-gulofuranolactone" to --3-oxo-1-gulofuranolactone--. Please make similar changes in claims 32, 51, 72 and 88.
- l. In claim 13 at line 5-6, please change "2,2-dimethyl 1,3-dioxane 4,6 dione" to --2,2-dimethyl-1,3-dioxane-4,6-dione--. Please make similar changes in claims 32, 51, 72 and 88.
- m. In claim 13 at line 6, please change "5.5" to --5,5--. Please make similar changes in claims 32, 51, 72 and 88.
- n. In claim 13 at line 7, please change "tetrahydrofuran 2,4-dione" to --tetrahydrofuran-2,4-dione--. Please make similar changes in claims 32, 51, 72 and 88.
- o. In claim 13 at line 7, please change "2,3 dihydroxy 2 cyclopropene 1 one" to --2,3-dihydroxy-2-cyclopropene-1-one--. Please make similar changes in claims 32, 51, 72 and 88.
- p. In claim 26 at line 2, please change "2,3" to --3,4--. Please make similar changes in claims 45, 66 and 82.
- q. In claim 39, please insert a period "." at the end of the claim.
- r. In claim 59 at line 1, please change "EOF" to --electro-osmotic flow--.
- s. In claim 59 at line 3, please change "absorptions" to --absorptivity--.
- t. In claim 59 at line 3 please change "its concentration" to --the concentration of the one or more probes--.
- u. In claim 75 at line 2, please change "ore" to --or--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-90 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for vinylogous carboxylic acid compounds having one or more enol functional groups in conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds, does not reasonably provide enablement for any vinylogous carboxylic acid compound. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The specification clearly defines the vinylogous compounds of the invention as compounds having one or more enol functional groups in conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds (see page 6 at lines 14-17; page 10 beginning at line 11). Since the specification clearly defines vinylogous carboxylic acid compounds as having those features, The scope of the claims exceeds the scope of the disclosure, comprising compounds not envisioned or taught by the Applicant.

Furthermore, the disclosure and claims recite ester and amide derivatives of vinylogous carboxylic acid compounds. While these compounds are derivatives of



vinyllogous carboxylic acid compounds, they are not vinyllogous carboxylic acid compounds as defined by Applicant in the disclosure. What is the definition of an ester or amide derivative of a vinyllogous carboxylic acid compound? An ester or amide derivative can have an ester or amide functionality at any position within the compound. The examples shown in the disclosure replace the enol functionality with the ester or amide functionality.

7. Claims 1-90 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for UV absorbing vinyllogous carboxylic acid compounds having one or more enol functional groups in conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds, does not reasonably provide enablement for all vinyllogous carboxylic acid compounds having one or more enol functional groups in conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The disclosure defines the vinyllogous carboxylic acid compounds as UV absorbing species (see page 6 beginning in line 9). Vinyllogous carboxylic acid compounds can comprise compounds having little UV absorptivity. Therefore, the disclosure is not enabling for any vinyllogous carboxylic acid compound having one or more enol functional groups in conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen

double bonds. The disclosure is only enabling for vinylogous carboxylic acid compounds comprising UV absorbing species.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 14, 17-19, 33, 35, 37, 52, 53, 57, 73, 74, 89 and 90 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "the vinylogous carboxylic acid UV-chromophore" in line 2. There is insufficient antecedent basis for this limitation in the claim. The UV-chromophore was never introduced, so any modification of it is indefinite.

Claim 17 recites the limitation "said vinylogous carboxylic acid compounds include positively charged cationic ester derivatives of said compound" in lines 1-2. This limitation is indefinite because it is either not further limiting or unclearly recited. What does the term "include" mean? Does the probe contain both vinylogous carboxylic acid compounds and ester derivatives of carboxylic acid compounds, or does the probe only contain ester derivatives of the carboxylic acid compounds? Furthermore, there is no antecedent basis for "said compound". What compound is "said compound"? Is "said compound" the compound from which the ester derivative is derived, or is it any derivative of any vinylogous carboxylic acid compound. Similar limitations of ester derivatives appear in claims 52, 73 and 89. Similar limitations of amide derivatives appear in claims 18, 53, 74 and 90.

Claim 57, as explained in the objections above, recites limitations containing ester and amide derivatives. Do the probes contain both the vinylogous carboxylic acid compounds and derivatives of those compounds, or do the probes only comprise the derivatives?

Claim 33 recites the limitation "said group of vinylogous compounds" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. First, "said group" lacks antecedent basis because a group is not introduced in the independent claim. Second, "vinylogous compounds" lacks antecedent basis because it is inconsistent with the vinylogous carboxylic acid compounds introduced in the independent claim.

Claim 33 recites the limitation "the vinylogous carboxylic acid UV-chromophore" in line 2. There is insufficient antecedent basis for this limitation in the claim. The UV-chromophore was never introduced, so any modification of it is indefinite.

Claim 35 recites the limitation "The probe of claims 1 or 20" in line 1. While claim 1 recites "A probe" in the preamble, claim 20 is "A background electrolyte". Even though claim 20 includes a probe in the limitations, the claim is indefinite because it is not clear whether claim 35 is modifying only the probe or if it is also modifying the background electrolyte. The same also applies to claim 37.

### ***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-4, 10, 13-16, 19, 39-42, 48, 51, 55, 60-63, 69, 72, 75, 77-79, 85 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Oehrle ("Controlled changes in selectivity of cation separations by capillary electrophoresis using various crown-ether additives", J. Chromatogr. A 745 (1996) 87-92).

Regarding claims 1-4, 10, 13, 14, 16, 32-37, 39-42, 48, 51, 60-63, 69, 72, 75, 77-79, 85 and 88, Oehrle teaches a method for separating ions by capillary electrophoresis using an electrolyte containing tropolone, an resonance-stabilized aromatic vinylogous carboxylic acid having a tautomeric keto-enol form (page 88). The method further includes the detection of ions in the sample by indirect UV detection (page 87). A power supply would inherently be used to provide the necessary potential for electrophoresis to occur.

Regarding claims 15 and 19, the ions that are being detected are process limitations relating to the intended use and do not limit the structure of the compound.

Regarding claim 55, the probe is capable of detecting ions of various molecular weights (see Figure 2).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Oehrle teaches all of the limitations recited in the claims, the reference is deemed to be anticipatory.

12. Claims 1-7, 13-16, 19-26, 32-37, 75-82 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Tu et al. ("The influence of fluorescent dye structure on the electrophoretic mobility of end-labeled DNA," Nucleic Acids Research, 1998, Vol. 26, No. 11, 2797-2802).

Regarding claims 1-7, 13-16, 19-26, 32-37, 75-82 and 88, Tu et al. teach device using capillary electrophoresis to detect charged molecules, wherein the electrolyte uses derivatives of squaric acid as probes (page 2797-2798). The squaric acid derivatives are resonance-stabilized compounds having keto-enol tautomeric forms (page 2799). The squaric acid derivatives further comprise amide derivatives (page 2799).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Tu et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

13. Claims 1-4, 7, 13, 14, 75, 77-79, 82 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Gadek et al. (U.S. Pat. No. 4,104,308).

Regarding claims 1-4, 7, 13, 14, 75, 77-79, 82 and 88, Gadek et al. disclose squaric acid, a resonance-stabilized vinylogous carboxylic compound (col. 1, lines 16-17).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Gadek et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

14. Claims 1-4, 7, 8, 13, 14, 75, 77-79, 82, 83 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Weinberg (U.S. Pat. No. 4,478,694).

Regarding claims 1-4, 7, 8, 13, 14, 75, 77-79, 82, 83 and 88, Weinberg discloses squaric acid, 2,5-dihydroxy-p-benzoquinone and rhodizonic acid, resonance-stabilized vinylogous carboxylic compounds (col. 12, Table 3).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Weinberg teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

15. Claims 1-6, 9, 13, 14, 16, 75, 77-81, 84 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Brois (U.S. Pat. No. 5,288,811).

Regarding claims 1-6, 9, 13, 14, 16, 75, 77-81, 84 and 88, Brois discloses croconic acid, a resonance-stabilized vinylogous carboxylic compound having hetero-atom substitutions (col. 2, lines 24-31).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Brois teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

16. Claims 1-4, 10, 13, 14, 16, 18, 75, 77-79, 85, 88 and 90 are rejected under 35 U.S.C. 102(b) as being anticipated by Theodoropoulos et al. (U.S. Pat. No. 5,215,890).

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Regarding claims 1-4, 10, 13, 14, 16, 18, 75, 77-79, 85, 88 and 90, Theodoropoulos et al. disclose a cationic amide derivative of tropolone, a resonance-stabilized vinylogous carboxylic compound (col. 3, formula V).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Theodoropoulos et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

17. Claims 1-4, 11, 13, 14, 16, 20-23, 30, 32, 33, 35, 75-79, 86 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by McClune (U.S. Pat. No. 4,828,983).

Regarding claims 1-4, 11, 13, 14, 16, 20-23, 30, 32, 33, 35, 75-79, 86 and 88, McClune discloses a buffered solution comprising dimedone, a resonance-stabilized vinylogous carboxylic compound (col. 10, lines 32-37).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since McClune teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

18. Claims 1-4, 12, 13, 14, 16, 75, 77-79, 87 and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Franke et al. (U.S. Pat. No. 4,340,595).

Regarding claims 1-4, 12, 13, 14, 16, 75, 77-79, 87 and 88, Franke et al. disclose 6-hydroxy-tetralone, a resonance-stabilized vinylogous carboxylic compound (col. 6, lines 24-30).

The preambles recited in the claims merely recite intended uses and do not further limit the claims. Since Franke et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 5-9, 11, 12, 17, 18, 43-47, 49, 50, 52, 53, 57, 64-68, 70, 71, 73, 74, 80-84, 86, 87, 89 and 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oehrle ("Controlled changes in selectivity of cation separations by capillary electrophoresis using various crown-ether additives", J. Chromatogr. A 745 (1996) 87-92) in view of supporting evidence provided by <http://www.whatislife.com/reader/dna-rna/dna-rna.html>.

Oehrle teaches the limitations recited in claims 1-4, 10, 13-16, 19, 39-42, 48, 51, 55, 60-63, 69, 72, 75, 77-79, 85 and 88 of the instant invention, as explained above in section 11.

The teachings of Oehrle differ from the limitations recited in the instant invention because Oehrle only discloses tropolone and does not disclose the other compounds recited in the instant claims.



A compound's UV absorptivity depends directly on the structure of the compound. Different geometrical structures have typical absorbances that lie within a particular region. As shown by <http://www.whatislife.com/reader/dna-rna/dna-rna.html>, aromatic ring structures have typical absorption bands in the UV region (see page 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the compound used in Oehrle to use any compound with a similar geometrical structure because UV absorbance is depends on the structure and, as <http://www.whatislife.com/reader/dna-rna/dna-rna.html> shows, aromatic ring structures typically have a strong absorption at UV wavelengths (~260nm). One skilled in the art would recognize that the choice of the compound depends specifically on the conditions of the experiment and aromatic ring structures similar in size and shape to tropolone would demonstrate similar absorptivity.

21. Claims 20-23, 29, 32-38, 54, 56, 58, 59 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oehrle ("Controlled changes in selectivity of cation separations by capillary electrophoresis using various crown-ether additives", J. Chromatogr. A 745 (1996) 87-92) in view of Jones et al. (U.S. Pat. No. 5,128,005).

Oehrle teaches the limitations recited in claims 1-4, 10, 13-16, 19, 39-42, 48, 51, 55, 60-63, 69, 72, 75, 77-79, 85 and 88 of the instant invention, as explained above in section 11.

Regarding claims 20-23, 29 and 32-37, Oehrle teaches a method for separating ions by capillary electrophoresis using an electrolyte containing tropolone, an

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resonance-stabilized aromatic vinylogous carboxylic acid having a tautomeric keto-enol form (page 88). The method further includes the detection of ions in the sample by indirect UV detection (page 87). A power supply would inherently be used to provide the necessary potential for electrophoresis to occur.

Regarding claim 38, the concentration of tropolone in the electrolyte is 3.0 mM (page 88).

The electrolyte of Oehrle differs from the instant invention because Oehrle does not teach the use of a buffer, as recited in claims 20 and 76; the use of capillaries with treated internal walls, as recited in claim 54; the ions are anions, as recited in claims 56 and 58; and the use of an EOF modifier, as recited in claim 59.

Buffers are commonly used in chemical analysis because they maintain the pH of the solution constant. For example, Jones et al. teach a method of analyzing analytes using capillary electrophoresis and indirect detection, wherein the electrolyte comprises a buffer (col. 1, lines 30-42).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolyte of Oehrle to use a buffer as taught by Jones et al. because a buffer would maintain the pH of the electrolyte at a constant value.

Regarding claims 54, 56 and 58, Jones et al. teach that the inner walls of the capillary can be treated to control the flow depending on the analyte, such as when anions are being detected (col. 10, lines 55-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the capillary of Oehrle to use a treated capillary as taught by Jones et al. because a treated capillary controls the flow of the analyte within the capillary.

Regarding claim 59, Jones et al. also teach that flow modifiers may be used to control the flow of the electrolyte (col. 5, lines 5-8).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolyte of Oehrle to use a flow modifier as taught by Jones et al. because flow modifiers allow the flow of the electrolyte to be controlled.

22. Claims 24-28, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oehrle ("Controlled changes in selectivity of cation separations by capillary electrophoresis using various crown-ether additives", J. Chromatogr. A 745 (1996) 87-92) in view of Jones et al. (U.S. Pat. No. 5,128,005), as applied above to claims 20-23, 29, 32-38, 54, 56, 58, 59 and 76 of the instant invention, and further in view of supporting evidence provided by <http://www.whatislife.com/reader/dna-rna/dna-rna.html>.

Oehrle and Jones et al. teach the limitations recited in claims 20-23, 29, 32-38 and 76 of the instant invention, as explained above in section 21.

The teachings of Oehrle and Jones et al. differ from the limitations recited in the instant invention because Oehrle and Jones et al. only discloses tropolone and does not disclose the other compounds recited in the instant claims.

A compound's UV absorptivity depends directly on the structure of the compound. Different geometrical structures have typical absorbances that lie within a particular region. As shown by <http://www.whatislife.com/reader/dna-rna/dna-rna.html>, aromatic ring structures have typical absorption bands in the UV region (see page 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the compound used in Oehrle and Jones et al. to use any compound with a similar geometrical structure because UV absorbance is depends on the structure and, as <http://www.whatislife.com/reader/dna-rna/dna-rna.html> shows, aromatic ring structures typically have a strong absorption at UV wavelengths (~260nm). One skilled in the art would recognize that the choice of the compound depends specifically on the conditions of the experiment and aromatic ring structures similar in size and shape to tropolone would demonstrate similar absorptivity.

23. Claims 60-66 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu et al. ("The influence of fluorescent dye structure on the electrophoretic mobility of end-labeled DNA," Nucleic Acids Research, 1998, Vol. 26, No. 11, 2797-2802) in view of Jones et al. (U.S. Pat. No. 5,128,005)

Regarding claims 60-66 and 72, Tu et al. teach device using capillary electrophoresis to detect charged molecules, wherein the electrolyte uses derivatives of

squaric acid as probes (page 2797-2798). The squaric acid derivatives are resonance-stabilized compounds having keto-enol tautomeric forms (page 2799). The squaric acid derivatives further comprise amide derivatives (page 2799). The apparatus would inherently comprise an electrical source to provide the potential necessary to separate the compounds by electrophoresis. Tu et al. also teach the detection of the compounds using an optical detector, wherein the detection is made by fluorescence (page 2797).

The apparatus of Tu et al. differs from the instant invention because Tu et al. do not disclose that the detector is capable of detecting wavelengths in the ultraviolet region, as recited in claim 60.

Jones et al. teach that indirect detection can be performed using fluorescent or UV absorbing ions (col. 1, line 55 to col. 2, line 26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the detector of Tu et al. to detect in the UV region because Jones et al. teach that indirect detection can equivalently use fluorescent or ultraviolet absorption based detection.

### ***Conclusion***

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm  
November 6, 2003

  
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